## Remarks

Claims 1 to 14 are currently pending. The rejections to claims 1-14 as outlined in the Office Action of March 3, 2003 are addressed below.

Claims 1-5, 8, and 11-13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Soichiro Kawakami (JP61037969) in view of Ohashi et al. (U.S. Patent No. 6,059,885) The Examiner contends that Soichiro teaches nested, axially aligned inner and outer tubes conforming to those claimed in claim 1 and that Ohashi teaches a flow divider such that in combination the two references would have rendered the presently claimed invention obvious to one of ordinary skill in the art at the time of the invention. Applicant traverses this rejection on the grounds that the Examiner has failed to establish a valid *prima facie* case for obviousness.

Ohashi et al. discloses a device and method for effecting thin film growth by chemical vapor deposition. A sheath flow of inert carrier gas is provided to prevent attachment of airborne particles or growth of film components on the oven walls. The Examiner has referred to JP61037969 in regards to the Ohashi reference. However, the description of the figures and disclosure of Ohashi et al. provided by the Examiner in the March 3, 2003 Office Action appear to be directed toward U.S. Patent No. 6,059,885 to Ohashi et al. Applicant's remarks herein assume that the Examiner's citation to the Ohashi et al. Japanese patent application is in error and that the Ohashi et al. U.S. Patent (No. 6,059,885) forms the basis for the pending rejection. All foregoing references herein to Ohashi et al. are directed to the U.S. Patent.

Figure 4 in Ohashi et al. shows a close-up schematic of the gas flow near the substrate 41 on which the film growth occurs. Gases carrying the reactive film components flow down through the oven toward the substrate 41 and then flow around the substrate 41 and the substrate support 42 into the lower chamber of the oven as illustrated in Figures 1, 2, 7, and 8. The substrate 41 and support 42 are not a "fluid flow divider" as the Examiner asserts, but rather an obstruction in the gas flow path around which the reactive gases flow. As noted at column 14 lines 10-60 and in Figure 4 of Ohashi et al., the upper portion of the reactor 41 is divided into areas Sx and Sz by a partition plate 18. Raw material gas is fed into space area Sx via gas supply port 16 from gas supply system 16. Carrier gas is fed into space area Sz via gas supply port 19 from gas supply Gz. Two separate gas streams are therefore fed into the upper region of reactor 41 and kept separate by partition plate 18 until they pass through straightening vane 17 into the

lower part of the reactor, which is a single, unpartitioned volume. In contrast, the flow divider of the present invention divides a gas flow into one subflow that enters an inner tube and another subflow that enters the annular volume between an inner tube and an outer tube. Ohashi et al. neither discloses, teaches, or suggests a fluid flow divider as claimed in the present invention.

Applicant further notes that the "disk" 17 with a plurality of small openings 17a and 17b that is shown in Figure 3 of Ohashi et al. is not a flow divider as argued by the Examiner in the middle of page 3 of the pending office action. Instead, as described at column 10, lines 25-50, the straightening vane 17 serves as a gas velocity regulator that causes the carrier gas sheath flow along the outer walls of the reactor to have a higher velocity than the reactive gas flowing into the center region of the reactor where it encounters the substrate onto which chemical vapor deposition occurs. The Examiner's arguments are flawed in that the holes 17a and 17b are not connected to a common space on the upstream side of the vane 17, but rather to separately controlled gas flow inputs Gx and Gz as discussed above.

The application of the straightening vane 17 in prior art systems is also shown in Figure 1A of Ohashi et al., and the resultant flow fields in the single reactor volume are illustrated in Figures 1B, 1C, and 1D. The purpose of the flow profile is to impart certain flow characteristics to better control the disruptive flow that occurs downstream near the heater/substrate holder. The vane, even with the variation in metering hole patterns between the inner and outer region, does not act to separate the gas flow from the inner and outer regions for re-introduction elsewhere for the purposes of balancing an overall pressure. Gas exiting the inner diameter region is immediately coupled back with the gas of the outer region. The vane is designed to impart a flow velocity profile of the resulting single body of gas, and not to divide the gas into equal portions for the purpose of balancing flow in a mixing region, much as happens in the gas metering tube we propose.

Likewise, the apparatus shown in Figure 6 of Ohashi et al. doers not include a flow divider. As in Figure 4, and as described at column 14, lines 33 to 40, reactive gases enter the reactor via ports 16 and pass through straightening vane 17. The straightening vane 17 has a different hole pattern in near its outer edge to affect a faster reactive gas velocity along the walls of the reactor. But no flow division takes place. As in the reference to Figure 4 of Ohashi et al.,

Applicant submits that the Examiner has mischaracterized the disclosed features of this reference.

An English translation of the Soichiro reference has been prepared and previously forwarded for the Examiner's convenience. As noted in Applicant's response in this matter filed December 13, 2002, Soichiro teaches a cathode 1 comprising a supply pipe 5 that supplies gas to the inside of a set of nested partition walls 2, 3. Gas is supplied to buffers 19 and 18, formed by only via outflow from the ports 15 and 14 in partition walls 3 and 2, respectively. No teaching or suggestion, either express or inherent, is provided in the cited reference to indicate that gas flow may occur into the buffers 18, 19, and 20 other than directly or indirectly via pipe 5. Applicant further respectfully submits that the Examiner's characterization of structural aspects of Soichiro are in error. Specifically, the Examiner has alleged that item 4 in Soichiro is "a gas flow divider." Soichiro labels item 4 as a "supporting plate." As is completely clear from both Figure 1 and the description in the first paragraph on page 7 of the English translation, this plate is solid except where it is penetrated by pipe 5 and is thus not in any way indicative or suggestive of a gas divider. Additionally, item 61, which the Examiner asserts may be labeled as a "single gas supply port" is designated as an "annular strut" by Soichiro. The annular strut as described in the enclosed English translation on page 7, first paragraph does not carry gas but rather provides structural support for the cathode assembly such that it is electrically isolated from the chamber wall 6 and provides a space through which the electroconductive member 10 passes for supply current to the cathode. Gas flows through the annular strut 61 into the cathode assembly 1 only via pipe 5 as discussed above. The apparatus shown in Figure 5 of Soichiro and described on pages 8 and 9 shows similar features for a cathode apparatus configured to expel gas axially rather than radially.

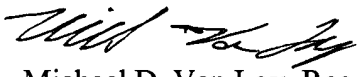
As noted above, claims 1 and 11 of the present application include the express limitation that gas is supplied to the gas delivery metering tube via a gas divider that creates one flow path supplying the inner tube and one flow path supplying the annular space between the inner and outer tubes. This structure is completely incompatible with the teachings of Soichiro. The supporting plate 4 of Soichiro is clearly not a gas flow divider as claimed in claims 1 and 11. Additionally, Soichiro does not provide for flow paths into both the inner tube and the outer tube of the apparatus, nor does it provide any teaching or suggestion that would lead one of ordinary skill in the art to modify the apparatus described therein to produce the instantly claimed

invention. As addressed above, Ohashi et al. does not teach a gas divider as posited by the Examiner, and it certainly does not provide any suggestion or motivation that would have directed one of skill in the art at the time of the present invention to modify the disclosure of Soichiro to produce the instantly claimed apparatus. The Examiner asserts at the bottom of page 3 that it would have been obvious to combine the "fluid flow divider" of Ohashi et al. with the nested tubes of Soichiro. However, the Soichiro system for improving the overall uniformity of gas velocity exiting the cathode structure 1 is based upon successive arrays of cylindrical volumes coupled to arrays of passages (holes in the walls) to further volumes and passages. The successive arrays of passages are more numerous, smaller, and not aligned between adjacent arrays. This is a common method of improving a fluid field. A basic problem in fluid flow arises in changing the nature of the flow from a point source type of inlet to a broader area or a line source in the case of a linear injector. This is typically accomplished by implementing a scheme of successive volumes coupled to finer and finer arrays of outlets as described in Soichiro. Changing this method, as suggested by the Examiner, by incorporating a flow divider to essentially short circuit some of the gas flow into the cathode assembly 1 around one or more of the sets of nested tubes with successively smaller orifices not only does not appear to be an obvious improvement to the scheme, but would also appear to modify the Soichiro apparatus in a manner that is inconsistent with its intended purpose. Such a modification is barred as an acceptable basis for a valid *prima facie* case for obviousness under 35 U.S.C. 103(a) as noted in MPEP § 2143.01. As such, Applicant respectfully submits that claims 1 and 11 are in condition for allowance. Because the other pending claims depend upon either independent claim 1 or upon independent claim 11, they are also allowable as originally submitted.

In view of the foregoing, it is respectfully submitted that this application is now in condition for allowance, and favorable action is requested. If any matters can be resolved by telephone, the Examiner is invited to call the undersigned agent at the telephone number listed

below. The Commissioner is hereby authorized to charge any other fees determined to be due to Deposit Account 50-2319 (Order No. A-67178-1/MSS/MDV).

Respectfully submitted,



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